MULTIMEDIA ⬛ UNIVERSITY

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FINAL EXAMINATION

TRIMESTER 1, 2018/2019

PAM0135 –ALGEBRA
(Foundation in Information Technology / Life Sciences)

26 October 2018
9.00 A.M – 11.00 A.M
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.

2. Answer **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

4. All necessary working steps **MUST** be shown.

Instruction: Answer **ALL** questions.

Question 1 [10 marks]

a.   Simplify the equation: $\left(\dfrac{-15a^4b^2}{5a^{10}b^{-3}} \right)^3 \left(4a^3\right)^{-2}$ (3 marks)

b.   Solve the equation.

$$\sqrt{x-5} - \sqrt{x-8} = 3$$ (3 marks)

c.   Solve the following inequality:

$$\frac{x+4}{2x-1} \le 3$$ (4 marks)

Question 2 [10 marks]

a.   Determine the domain of the functions $f(x) = \dfrac{2}{x+3}$, $g(x) = \dfrac{1}{x}$ and $f \circ g$
                                                                     (3 marks)

b.   Solve the following equations:
     i. $3^{2x} + 3^x - 2 = 0$ (4 marks)

     ii. $\log_2(x-6) + \log_2(x-4) - \log_2 x = 2$ (3 marks)

Question 3 [10 marks]

     Given the quadratic function $f(x) = 4 - (x-1)^2$.

a.   Find the vertex, the x-intercepts, the y-intercept, and the axis of symmetry
of the graph of f.   (5 marks)

b.   Sketch the graph of $y = f(x)$. Show clearly the vertex, the x-intercepts,
the y-intercept, and the axis of symmetry on the graph.   (3 marks)

c.   Use transformation of the graph of $f(x) = \log_2(x)$ to graph the function.
$f(x) = \log_2(-x)$. Show clearly the graph's x-intercepts. What is the vertical
asymptote?   (2 marks)

Continued...

Question 4 [10 marks]

a.　Use the Principle of Mathematical Induction to show that:

$$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \ldots\ldots + \frac{1}{2^n} = \frac{2^n - 1}{2^n}.$$
(5 marks)

b.　In the expansion of $(x - 2y)^8$, find:

　　i.　　the coefficient of x^5.
(2 marks)

　　ii.　the last three terms of the expansion.
(3 marks)

Question 5 [10 marks]

a.　Find the sum of the geometric series　$1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8} \ldots, + \frac{1}{128}$.
(5 marks)

b.　The fourth term and the eight term of an arithmetic sequence are 19 and 43 respectively.

　　i.　　Find the first term and the common difference of the sequence.
(3 marks)

　　ii.　Find the twentieth term of the sequence.
(1 mark)

　　iii.　Find the sum of the first 10 terms of the sequence.
(1 mark)

End of Paper

APPENDIX

$a^2 - b^2 = (a-b)(a+b)$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^2 = a^2 - 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$\log_b b = 1$

$\log_b (MN) = \log_b M + \log_b N$

$\log_b M^p = p \log_b M$

$\log_b 1 = 0$

$\log_b \left(\dfrac{M}{N} \right) = \log_b M - \log_b N$

$\log_b M = \dfrac{\log_a M}{\log_a b}$

$a_n = a_1 + (n-1)d$

$S_n = \dfrac{n}{2}(2a_1 + (n-1)d) = \dfrac{n}{2}(a_1 + a_n)$

$a_n = a_1 r^{n-1}$

$S_n = \dfrac{a_1(1 - r^n)}{1 - r}$

$S = \dfrac{a_1}{1 - r}$, infinite sum $|r| < 1$